

ABSTRACT

A new method and apparatus for visualization and manipulation of real 3-D objects are disclosed. This new approach utilizes compressed digital video taking advantage of modern video compression technology. The entire system consists of the image acquisition device, the viewing/manipulation program and the 3-D image database. The system first captures images of the object from all possible view angles as a sequence of images (a video). As neighboring images within the sequence will generally be similar, the sequence will be amenable to standard video compression techniques such as MPEG. The acquired video data (rendition of a real 3-D object) is then stored into a database for later access, for instance, over the Internet.

Through specially developed software, the stored data can be manipulated while viewing the object. The user simply inputs—via a mouse, for instance—the view angle and the software automatically displays the appropriate frame within the video (stored data). The software allows various object manipulations such as rotation in arbitrary direction, as well as zoom, pan, etc. A particular implementation of the viewing program using a Pentium III processor, randomly accessing an MPEG sequence, through pre-decoding of certain anchor frames, is able to decode fast enough for users to perform real-time manipulation of the object.

The captured 3-D image data of an object is stored into a centralized (or distributed) database and users may access the data through the assigned URL for the object over the Internet. The data may or may not be password protected. As such, the overall system is an implementation of a *one-stop service* for individuals wishing to provide 3-D visualization of real 3-D objects over the Internet.

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